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ESCP BEST PRACTICE

The first nationwide implementation of pharmaceutical care practices through a continuous professional development approach for community pharmacists

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Abstract

Background Noncommunicable diseases account for the majority of all deaths and impose a high socioeconomic burden, causing disability and premature deaths. Pharmacists can contribute to the prevention and management of these diseases through the provision of pharmaceutical care services.

Aim The aim of this study was to implement a nationwide practice developed by the Turkish Pharmacists' Association aiming to realize pharmaceutical care provision of standard quality to patients with asthma, chronic obstructive pulmonary disease, diabetes and hypertension at community pharmacies through a continuous professional development approach.

Setting Community pharmacies in Turkey.

Development A project with the involvement of all community pharmacists who were willing to participate was developed. After piloting, the 'project' turned into a 'practice' with a focus on asthma, chronic obstructive pulmonary disease, diabetes and hypertension management.

Implementation The training process occurred as a peer-training activity. Academic staff trained the trainer pharmacists during a 3-day course. Community pharmacists (n = 6161) received training regarding pharmaceutical care, asthma, chronic obstructive pulmonary disease, diabetes and hypertension from their peer trainers (n = 341) and began to practice pharmaceutical care and follow-up of patients' outcomes on a regular basis.

Evaluation Among all community pharmacists in Turkey (n = 26,177), 24% attended training. Among these pharmacists, 21% started to implement practice. With community pharmacists' contribution to patient care, significant improvements in the majority of the outcome parameters regarding asthma, chronic obstructive pulmonary disease, diabetes and hypertension management were noted.

Conclusion This first nationwide practice showed us that community pharmacists can help improve the health outcomes of patients with asthma, chronic obstructive pulmonary disease, diabetes and hypertension through the provision of pharmaceutical care services.

Keywords Asthma · Continuous professional development · Community pharmacists · COPD · Diabetes · Hypertension · Pharmaceutical care intervention

Facilitators of best practices

- The ability to reach and invite all community pharmacists into the practice enabled us to reach patients from different regions.
- Obtaining workforce and financial sources from a well-established pharmacy association enabled rapid problem solving during the implementation phase.

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- The practice has increased given the demand and willingness of the Turkish pharmacist and key stakeholders, resulting in a high commitment.

Barriers to best practices

- Documentation as an essential process in quality assurance and the very first step of the pharmaceutical care process was not a well-established cultural behavior for the pharmacists.
- Pharmacists need better software skills for efficiently documenting, assessing and following up patient data.
- Pharmacists needed to be readier to change and to accept new responsibilities.

Background

According to the World Health Organization (WHO), noncommunicable diseases (NCDs), such as cardiovascular diseases, cancers, respiratory diseases and diabetes, account for 71% of all deaths worldwide [1]. Likewise, in Turkey, NCDs not only account for the majority of overall deaths (87.5%) but also represent a high socioeconomic burden causing disability and premature deaths [2].

As the most readily accessible primary health care service providers, pharmacists can contribute to the prevention and management of NCDs in the community by improving medication adherence and identification and the prevention/management of drug-related problems through the provision of pharmaceutical care services. In Turkey, greater than 27,000 pharmacists provide community pharmacy services and are represented by the Turkish Pharmacists' Association (TPA), which is the national professional organization with the vision of extending the role of the pharmacist beyond dispensing medicines toward a system including the pharmacist's responsible provision of patient care and follow-up [3–5]. Although community pharmacies are private commercial enterprises, these facilities are considered as primary health care settings in Turkey. Since 2012, the number of community pharmacies has been arranged in such a way that one pharmacy exists for at least 3500 people, according to the population within the boundaries of the district. In community pharmacies, pharmacists provide mainly medication review, dispensing and counseling services. Only pharmacists are allowed to open/manage pharmacies and have full ownership of only one pharmacy. They must register Pharmacy Chambers established in Turkey. All Pharmacy Chambers are under the guidance of TPA. Pharmacy technicians, interns and assistant/second pharmacists can support the pharmacists through their daily workforce.

One of the principal elements of pharmaceutical care is the prevention, detection and resolution of drug-related problems to improve a patient's health outcomes and quality of life [6]. A drug-related problem (DRP) is an event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes [7]. In several studies investigating the role of the pharmacist in the management of NCDs, such as cancer, chronic obstructive pulmonary disease (COPD), asthma, diabetes and hypertension, the rate of DRPs ranged between 20 and 75% [4, 8–11]. As DRPs may be prevented, detected and resolved in community pharmacy settings, the input of the pharmacist is essential. To competently provide pharmaceutical care services in the community setting, pharmacists must keep updated on clinical knowledge and practice and thus be lifelong learners. Continuing professional development (CPD) is a self-directed, continuous, systematic and result-oriented approach for lifelong learning. CPD programs help pharmacists keep their professional knowledge updated and gain professional competence through the continuous development of various skills [12].

The Turkish Pharmacists' Association considered the CPD approach as an effective method of delivering education about the prevention and management of NCDs to community pharmacists and developed a nationwide practice aiming to realize pharmaceutical care provision of standard quality to patients with NCDs at community pharmacies through a CPD approach. The first modules were about asthma, COPD, diabetes and hypertension.

Aim

The aim of this study was to develop the clinical outcomes of a nationwide practice aiming to realize pharmaceutical care provision of standard quality to patients with asthma, COPD, diabetes and hypertension at community pharmacies through a CPD approach.

Ethics approval

Ethics approval was obtained from the Clinical Research Ethics Committee of Kartal Kosuyolu Higher Specialization Training and Research Hospital (issue numbers: 2017/7/44 [diabetes module]; 2017/7/43 [asthma/COPD module]; 2018/7/77 [hypertension module]).

Development

The TPA developed and funded a project named "Rehber Eczanem (RE) [i.e.,. *My Guiding Pharmacy*]". The workforce and financial sources from TPA, which is a well-established association in Turkey, enabled rapid project development, implementation and problem solving. Based on routine discussions with various key stakeholders from the government and private sectors about their needs as well as the demand and willingness of the Turkish pharmacist, TPA decided to establish such a project.

A project piloting the asthma/COPD module was conducted in 2015. After piloting, the 'project' turned into a 'program' and consequently into a 'practice'. The practice continued with the asthma/COPD module in 2016; diabetes and hypertension modules were added in 2017 and 2018, respectively. With the emergence of COVID-19 as a global pandemic, this practice has been suspended for approximately two years; it will be restarted in 2022 with new modules. This paper consists of data collected until the end of 2019.

The core components of the practice development included (1) practicing core teams with different expert backgrounds, (2) an online accessible portal for data collection and monitoring, (3) a peer training process that enables learning in a more convenient and friendly environment, and (4) the presence of executive managers at TPA who support the projects. The first 3 core components were described in detail.

Practice core team

The core team of RE practice consisted of a coordinator, advisors from academia (n = 3), national pharmacist trainers (n = 3) and administrative staff (n = 5). The core team was responsible for the development and coordination of the practice both at the academic and administrative levels, organizing the education timeline and providing materials, such as lecture notes, reading documents, videos, demonstration tools, CPD portfolio templates, and self-assessment tools.

Tools

An official website (i.e., RE Portal) was developed for the main purpose of patient data collection and monitoring. This portal enabled pharmacists to record the predetermined data of each patient to be collected separately for each encounter/visit. Data were encrypted and secured by the inherent information technology team of the TPA. TPA administrators in charge of this project could access all the data, whereas the relevant community pharmacists who received the CPD training could access only the data they collected upon the informed consent of the patients. The academic advisor(s) structured a data collection tool for each module designating which demographic, medication-related and clinical data to be collected and monitored during the patient care process. The portal also allows pharmacists to register for learning activities and access educational materials and tools [13]. Each pharmacist participating in the RE practice was provided with a unique user ID and password for signing in the RE Portal.

Training

The academic advisors developed the training program, content and material. The training process occurred as a peer-training activity. TPA assigned trainer pharmacists (n = 341) from each Regional Chamber of Pharmacy (n = 54). Academic staff trained the trainer pharmacists during a 3-day (training the trainer) course on the CPD approach and the particular NCD (i.e., asthma/COPD, diabetes or hypertension) management. The trainer pharmacists were provided with a standard training program and material (i.e., training manual, PowerPoint presentations, video recordings of training sessions, and demo materials, such as insulin pens, glucometers, and sphygmomanometers). The trainer pharmacists then trained the community pharmacists (n = 6161) to participate in the practice coordinated by their regional chambers. Through the Regional Chamber of Pharmacy, the training became accessible to all community pharmacists and thus enabled them to reach patients from different regions.

Continuing professional development approach

The traditional CPD cycle consisting of four steps included the following: "*reflect*: the pharmacists evaluated their professional development using their CPD portfolios; *plan*: the pharmacists assessed their competencies using the self-assessment tools; *learn*: the pharmacists learned through education modules by a peer-training approach; *evaluate*: the pharmacists evaluated their professional development based on the quality indicators mentioned in their CPD portfolios." Then, the pharmacists applied their knowledge and skills for the pharmaceutical care of patients through a structured process. This application step should be followed by the whole cycle indefinitely until the target level of professional development is reached.

Sample outline of the Pharmaceutical Care process (e.g., Asthma/COPD Module)

At the first visit, the pharmacist collected demographic, disease-related and medication-related data. At every visit, the pharmacist measured the peak expiratory flow rate of the patients, administered an asthma control test (ACT) or COPD assessment test (CAT), and assessed the inhalation technique of the patients [14, 15]. CAT scores range from zero to 40 [15]. Based on the impact level of COPD, patients are categorized as low, medium, high and very high. The higher the score, the worse the condition. At every visit, the pharmacist identified drug-related problems of the patients, addressed them accordingly, and provided education on inhalation technique and peak flow meter use. Information on the adverse effects of the drugs, smoking cessation and lifestyle changes, and the importance of avoiding asthma triggers was provided. Patients were referred to the physician when necessary, and all of the data and services provided were documented electronically.

Piloting

During the development phase, a pilot project was conducted using an asthma/COPD module with the involvement of 24 trainer pharmacists from 8 regional chambers of pharmacy in 2015. After observing the positive outcomes of the pilot, all community pharmacists in Turkey were invited to join this practice in 2016.

Implementation

The first phase of the implementation involved the training of the pharmacist, whereas the second phase involved the implementation of what they learned from the training into the practice and directly to patient care. Therefore, the evaluation of the nationwide program was mainly based on the second phase of the implementation, where the patients' clinical outcomes of NCDs were measured.

Phase 1

Community pharmacists received training for pharmaceutical care, asthma/COPD, diabetes and hypertension modules from their peer trainers. Moreover, there were no prerequisites for the modules. It was not mandatory for pharmacists to register for all modules.

After completing these face-to-face training modules, pharmacists were asked to provide pharmaceutical care services and follow-up patient outcomes on a regular basis.

There is no regulatory requirement for CPDs for pharmacists in Turkey. Therefore, the training was voluntary, and pharmacists did not pay or were not paid for it.

Phase 2

Pharmacists who would like to provide pharmaceutical care to their patients completed the second phase of the implementation. Only pharmacists who enrolled in the training provided pharmaceutical care.

Pharmacists gathered patients during their community pharmacy visits. If patients had a diagnosis and medication prescription regarding the interest of the training, patients were asked to participate after obtaining informed consent. Patient participation was also voluntary.

Evaluation

Almost a quarter (n = 6161) of all community pharmacists (approximately 27,000) in Turkey were involved in the training modules. The majority of the community pharmacists involved in this practice were female (70%), and their mean [standard deviation (SD)] age was 42.9 (11.35) years.

Among these 6161 pharmacists, 21% (n = 1278) recorded the initial data (collected at the first visit) of at least one patient. The median (IQR) number of patients per pharmacist was 3 (1–6), whereas the median (IQR) number of visits per patient was 1 (1–2) for all disease groups (asthma, COPD, diabetes, hypertension). Only the data of patients with at least two visits [n = 313 (asthma); n = 147 (COPD); n = 277 (diabetes); n = 254 (hypertension)] were included and analyzed in this paper.

Parameters

The impact of the pharmacist's input was assessed by testing the significance of improvement in clinical and allied parameters, such as medication adherence, medication knowledge, and symptom scores, as mentioned below.

These parameters were measured by using a medication adherence scale [16, 17], medication knowledge score [18] and other scales developed by the authors, such as inhalation technique (5-item questionnaire), weekly need for reliver mediation (1-item questionnaire), insulin injection technique (10-item questionnaire) and blood pressure technique (5-item questionnaire). The higher the score patients receive from these scales, the better their techniques are.

Documentation is an essential process in quality assurance and represents the very first step of the pharmaceutical care process. Therefore, the parameters were carefully selected by the core team. However, based on the wide

difference in documenting such parameters, it was clear that the pharmacists did not exhibit well-established cultural behaviors. Moreover, pharmacists' poor software skills for efficiently documenting, assessing and following-up patient data potentially also explained the reason for the wide difference in documenting parameters.

Table 1 Characteristics of the patients

	Asthma n = 2697	COPD n = 199	Diabetes n = 1500	Hypertension n = 1030
Gender, female [%]	50%	20%	48%	53%
Age, years [mean (SD)]	58.8 (12.35)	59.8 (12.11)	57.9 (11.76)	60.7 (11.41)
Smoking [%]	22%	31%	22%	20%
Alcohol consumption [%]	15%	18%	16%	15%
Regular exercise [%]	26%	20%	26%	11%

COPD: chronic obstructive pulmonary disease; SD: standard deviation

Patient characteristics

A total of 2697, 199, 1500 and 1030 patients from 1278 pharmacies were involved in the modules for asthma, COPD, diabetes and hypertension care, respectively, and had their initial data recorded. Approximately half of the patients in the asthma, diabetes and hypertension care groups were female, whereas the majority (80%) of the COPD patients were male. The mean (SD) ages of the patients were 58.8 (12.35), 59.8 (12.11), 57.9 (11.76), and 60.7 (11.41) years for asthma, COPD, diabetes and hypertension, respectively (Table 1).

Asthma care

The mean (SD) duration between patients' first and second visits was 70.5 (74.35) days. All of the parameters investigated improved after pharmacists' intervention; measurements at the first vs. second visits were 286.1 ± 122.57 vs. 310.8 ± 127.44 ($p < 0.001$) for peak flow rates, 3.7 ± 1.66 vs. 4.7 ± 1.46 ($p = 0.025$) for inhalation technique scores, 6.69 ± 16.9 vs. 4.85 ± 15.09 ($p < 0.001$) for the weekly need

Table 2 Clinical outcomes among patients with asthma and chronic obstructive pulmonary disease

Parameters	Asthma				COPD			
	Initial mean ± SD	Second mean ± SD	p	n	Initial mean ± SD	Second mean ± SD	p	n
Peak flow rate (L/min)	286.1 ± 122.57	310.8 ± 127.44	**< 0.001**	259	N/A	N/A	N/A	N/A
ACT (min: 5 – max: 25; goal: 25) or CAT (min: 0 - max: 40; goal: 0) score	19.58 ± 5.68	20.89 ± 5.82	**< 0.001**	203	19.50 ± 8.14	17.87 ± 7.63	**< 0.001**	113
Inhalation technique (min: 0 – max: 6; goal 6) score	3.7 ± 1.66	4.7 ± 1.46	**0.025**	205	3.9 ± 1.68	5.3 ± 1.07	**0.001**	105
Weekly need for reliever medication (min: 0; goal: 0)	6.69 ± 16.9	4.85 ± 15.09	**< 0.001**	217	8.15 ± 18.79	5.17 ± 10.39	**< 0.001**	113

ACT: Asthma Control Test; COPD: chronic obstructive pulmonary disease; CAT: COPD Assessment Test; N/A: not available; SD: standard deviation

Table 3 Clinical outcomes among patients with diabetes and hypertension

Parameters	Diabetes				Hypertension			
	Initial mean ± SD	Second mean ± SD	p	n	Initial mean ± SD	Second mean ± SD	p	n
Blood glucose measured at pharmacy (mg/dL)	208.6 ± 90.16	185.2 ± 80.60	**0.008**	145	167.4 ± 76.88	189.1 ± 77.73	0.064	22
Fasting blood glucose (mg/dL)	173.2 ± 63.70	140.3 ± 44.10	**< 0.001**	112	150.5 ± 51.60	155.4 ± 62.15	0.632	23
HbA1c (%)	8.8 ± 2.12	7.5 ± 1.82	**0.001**	57	6.9 ± 2.59	7.1 ± 2.55	0.098	4
LDL-cholesterol (mg/dL)	131.1 ± 46.13	122.5 ± 43.70	**0.039**	59	146.2 ± 49.37	121.1 ± 29.63	0.061	9
Systolic BP (mmHg)	135.0 ± 19.12	133.5 ± 17.92	0.241	182	139.7 ± 24.14	136.3 ± 21.42	**0.008**	239
Diastolic BP (mmHg)	79.6 ± 10.73	79.3 ± 11.04	0.739	181	81.5 ± 13.12	80.5 ± 12.43	0.273	240
Medication adherence score (max: 4; goal: 0)	2.1 ± 1.39	2.1 ± 1.12	0.925	57	0.5 ± 0.97	0.3 ± 0.72	**< 0.001**	171
Insulin injection (min: 0 - max: 10; goal: 10) or BP measurement technique (min: 0 - max: 5; goal: 5) score	7.4 ± 2.43	8.7 ± 2.38	**< 0.001**	76	3.3 ± 2.16	4.4 ± 1.53	**< 0.001**	162
Medication knowledge score (min: 0 - max: 8; goal: 8)	4.8 ± 1.27	5.2 ± 1.38	**0.021**	83	4.8 ± 1.41	5.0 ± 1.29	**0.030**	170

BP: blood pressure; HbA1c: glycosylated hemoglobin; LDL: low-density lipoprotein; SD: standard deviation

for reliver medication and 19.58 ± 5.68 vs. 20.89 ± 5.82 (p < 0.001) for the ACT scores, respectively (Table 2).

COPD care

The mean (SD) duration between patients' first and second visits was 57.6 (52.90) days. All of the parameters investigated improved after pharmacists' intervention; measurements at the first vs. second visits were 3.9 ± 1.68 vs. 5.3 ± 1.07 (p = 0.001) for inhalation technique scores, 8.15 ± 18.79 vs. 5.17 ± 10.39 (p < 0.001) for the weekly need for reliver medication and 19.50 ± 8.14 vs. 17.87 ± 7.63 (p < 0.001) for the CAT scores, respectively (Table 2).

Diabetes care

The mean (SD) duration between the patients' first and second visits was 81.2 (94.22) days. The following parameters improved after pharmacists' intervention: measurements at the first vs. second visits were 208.6 ± 90.16 vs. 185.2 ± 80.60 (p = 0.008) for blood glucose (mg/dL) measured at the pharmacy, 173.2 ± 63.70 vs. 140.3 ± 44.10 (p < 0.001) for fasting blood glucose (mg/dL), 8.8 ± 2.12 vs. 7.5 ± 1.82 (p = 0.001) for HbA1c (%) and 131.1 ± 46.13 vs. 122.5 ± 43.70 (p = 0.039) for LDL (mg/dL) levels, 7.4 ± 2.43 vs. 8.7 ± 2.38 (p < 0.001) for insulin injection technique and 4.8 ± 1.27 vs. 5.2 ± 1.38 (p = 0.021) for medication knowledge scores of the patients (Table 3). The rate of patients who reached the glycemic goal (i.e., HbA1c < 7%) [19] increased from 19 to 44% after the pharmacists' intervention. However, blood pressure (BP) levels [systolic BP: 1st visit 135.0 ± 19.12 vs. 2nd visit 133.5 ± 17.92 (p = 0.241) and diastolic BP 1st visit 79.6 ± 10.73 vs. 2nd 79.3 ± 11.04 (p = 0.739)] and medication adherence scores [1st visit 2.1 ± 1.39 vs. 2nd visit 2.1 ± 1.12 (p = 0.925)] were not affected by pharmacists' input.

Hypertension care

The mean (SD) duration between patients' first and second visits was 65.2 (62.09) days. Systolic blood pressure levels (mmHg), medication adherence, medication knowledge and blood pressure measurement technique scores in the first and second visits were 139.7 ± 24.14 vs. 136.3 ± 21.42 (p = 0.008), 0.5 ± 0.97 vs. 0.3 ± 0.72 (p < 0.001), 4.8 ± 1.41 vs. 5.0 ± 1.29 (p = 0.030) and 3.3 ± 2.16 vs. 4.4 ± 1.53 (p < 0.001), respectively. These parameters significantly improved after the pharmacists' intervention (Table 3). The rate of patients who reached the blood pressure goal (i.e., systolic/diastolic blood pressure < 140/90 mmHg) [20] increased (from 33%/51%–40%/75%, respectively) after the pharmacists' intervention. However, blood glucose (mg/dL) (1st visit 167.4 ± 76.88 vs. 2nd visit 189.1 ± 77.73 (p = 0.064)), diastolic blood pressure (mmHg) (1st visit 81.5 ± 13.12 vs. 2nd visit 80.5 ± 12.43 (p = 0.273)) and LDL (mg/dL) (1st visit 146.2 ± 49.37 vs. 2nd visit 121.1 ± 29.63 (p = 0.061)) levels were not affected by pharmacists' input.

Statistical analysis

Microsoft Excel 2016 and SPSS version 25 were used for the analysis. Normality was tested among the variables. Chi-square or Fisher's exact tests were used to compare categorical variables, and continuous variables were compared using Mann–Whitney U tests or Student's t tests, as appropriate. A p value < 0.05 was considered statistically significant.

Discussion

Programs led by community pharmacists to improve medication use and patient outcomes have been implemented in different countries with various names [21]. These programs targeted chronic diseases, mainly hypertension, diabetes, dyslipidemia, asthma and COPD [21]. It has been well established that pharmacist-led pharmaceutical care can have a significant positive impact on clinical, humanistic, and economic outcomes [22–24].

The Turkish Pharmacists' Association developed a nationwide practice aiming to realize pharmaceutical care provision of standard quality to patients with NCDs at community pharmacies through a CPD approach. The first modules were about asthma, COPD, diabetes and hypertension.

In our asthma patients, this practice resulted in significant improvement in peak flow rates, need for reliver medication, inhalation technique and ACT scores (p < 0.05). These results were consistent with those reported in the literature. For example, in Australia, pharmacist-led asthma programs improved the patients' knowledge score (p < 0.01), severity of asthma (from 88 to 53%), quality of life score (p = 0.05) and control of asthma score (p < 0.01) [25]. In France, pharmacists were able to improve asthma patients' inhaler technique (p < 0.01) and medication adherence (p < 0.001) [26]. Community pharmacist-led pharmaceutical care improved patient outcomes in many cases [21–24, 27, 28].

In our COPD patients, the pharmacist-led intervention resulted in significant improvement in the need for reliver medication, CAT and inhalation technique scores (p < 0.05). These findings are consistent with the results reported in the literature, where the pharmacist-led intervention significantly improved inhalation scores and medication adherence [29, 30]. Pharmacist-led pharmaceutical care programs for COPD patients improved inhalation scores [mean estimated

difference (Δ), 13.5%, medication adherence (Δ, 8.51%) and hospitalization rates (9 vs. 35; rate ratio, 0.28)] in the intervention group compared to the control group in Belgium [30]. Another pharmacist-led intervention for asthma and COPD patients was the improved inhalation technique in Germany, where 78.9% of patients had at least one mistake in inhaler use before the intervention and the number was reduced to 28.3% after the intervention [31].

In our diabetic patients, HbA1c, blood glucose and LDL levels as well as injection technique and medication knowledge scores were significantly improved by the pharmacist's intervention ($p < 0.05$). This finding is similar to the results reported in the literature [23, 32]. In the UK, community pharmacists were able to improve the clinical outcomes of diabetic patients, including HbA1c level ($p < 0.001$), blood pressure level ($p = 0.01$), body mass index ($p < 0.001$) and blood glucose levels ($p < 0.001$). Moreover, community pharmacists also improved humanistic outcomes, such as diabetes-related quality of life ($p = 0.001$), diabetes knowledge ($p = 0.018$), belief about the need for medication ($p = 0.004$) and reduced concerns regarding medication ($p < 0.001$) [33]. The pharmacist-led pharmacotherapy follow-up plan for diabetes significantly reduced drug-related problems (intervention group (IG) 1.7 ± 1.2 vs. control group (CG) 3.1 ± 1.2, $p < 0.0001$), HbA1c (IG 7.9 ± 1.7 vs. CG $8.5 \pm 1.9\%$, $p < 0.0001$), FBG (IG 154 ± 61.3 vs. CG 168 ± 57.8 mg/dl $p = 0.0004$), total cholesterol (IG 202 ± 41.5 vs. CG 217 ± 43.5 mg/dl, $p = 0.0054$) and systolic BP (IG 135 ± 16.4 vs. CG 150 ± 19.9 mmHg, $p = 0.0006$). Patient knowledge scores (IG 17.9 ± 3.7 vs. CG 11.4 ± 6.7 points, $p < 0.0001$) were also increased by this program in Spain [34].

In hypertension patients, medication adherence, blood pressure measurement technique, medication knowledge scores and systolic blood pressure levels improved with the pharmacist's intervention. This finding is similar to the results reported in the literature, where pharmacist input resulted in improvements in the reduction of blood pressure and medication adherence [22, 35]. A community pharmacist-led intervention resulted in improved adherence to antihypertensive medication (57–64% (CG) vs. 60–74% (IG), $p = 0.23$) and reduced systolic BP (mean reduction 10 mmHg (IG) vs. 5 mmHg (CG), $p = 0.05$) in Australia [35]. A community pharmacy-led intervention in patients with diabetes and hypertension was effective in improving BP control ($p = 0.021$) in the US. [36].

All these existing pharmacist-led studies demonstrated good practice examples, but our approach is unique because it represents the largest involvement of community pharmacists and their self-demand to contribute more to patient care. Providing well-organized and structured training, intervention and data collection increased the sustainability of our approach.

Despite some legal, technological, and logistical challenges in fully implementing this practice, desirable clinical outcomes were still achieved. The major strength of this practice is that it was the first (and still unique) example of a nationwide practice aiming to realize pharmaceutical care provision of standard quality to patients at community pharmacies. Before this practice, the impact of pharmacists in the community setting was established by the results of local academic studies of various methodologies, where the majority of the pharmacists were students of clinical pharmacy graduate programs. Obtaining similar results with those obtained from academic studies reflects that the pharmacists who were involved in this practice and showed a commitment to follow-up the patients reached success. No incentives were provided to the participating pharmacists, and their services were not reimbursed. Therefore, a large number of pharmacists ($n = 6161$) involved in and completing the training phase of this practice under voluntary conditions is another success reflecting the high motivational environment created by the TPA.

On the other hand, there are still many areas to improve. Although 6161 pharmacists registered to the portal and fully completed the trainings, only approximately one-fifth of these pharmacists recorded patient data collected on the first encounter with the patient. Although the pharmacists were very familiar with electronic operating systems (as their use has been mandatory since 2010), they were not familiar with the use of electronic systems for clinical purposes, such as documenting patient data for record-keeping and follow-up. They needed some time to become familiar with the website (RE Portal) where they electronically recorded patient information, and thus, not all patient information was always complete. Another drawback was that pharmacists were not used to spending approximately 15–20 min for patient interaction, data collection, assessment and documentation, which occurred on the first encounter with the patient. Therefore, many of them preferred to give the service but did not document it. Although the importance of documentation as an essential process in quality assurance was emphasized during all trainings, it requires repeated practice and time to turn such a practice into a cultural behavior at the workplace. Another concern experienced during this practice involved peer training. The training at the local chambers was provided by the pharmacists who received the 3-day train-the-trainer course. During these training sessions, there was no problem regarding the transfer of the scientific knowledge, but the rationale of data collection seemed to be 'lost in translation'. Although only the minimum data needed for the provision of the pharmacist's patient care were to be collected, there were complaints

from the pharmacists about the amount of data collection. The aim of data collection, which is the very first step of pharmaceutical care processes, seemed not to be properly understood. Additionally, these complaints might have been partly due to the low software skill levels of some pharmacists. However, another area of improvement was the need for regularly updating the RE Portal to make it more user-friendly. All these challenges will be considered for future modification of the program. One possible solution is involving pharmacy staff who can support pharmacists on such issues.

Conclusion

This first nationwide practice showed us that community pharmacists can help improve the health outcomes of patients with asthma, COPD, diabetes and hypertension through the provision of pharmaceutical care services. New strategies should be developed with the involvement of all stakeholders to make this practice sustainable and eventually profitable.

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Conflicts of interest All authors declare they have nothing to disclose.

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